Inspecting for Air Barriers

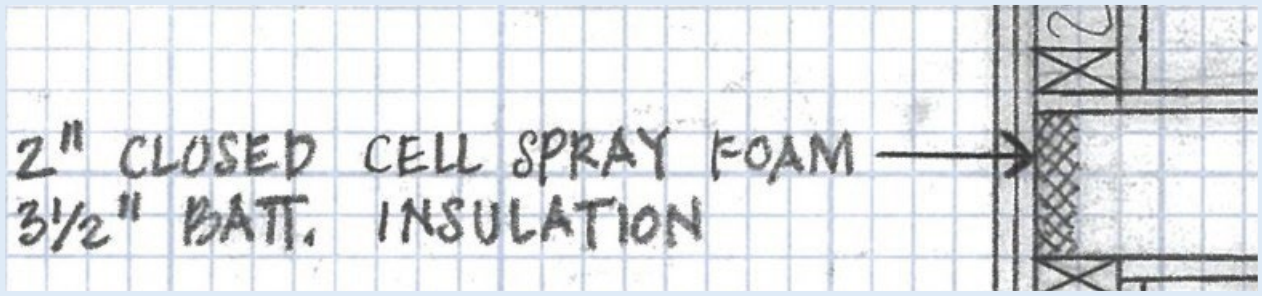
Building Codes Support Program

What to Look For…

How should air barriers be installed?

What are the requirements?

What should I be looking for?



SHUMS CODA ASSOCIATES

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Air Leakage / Air Barrier Requirements

R103.2 (2015 & 2018)

Required to be placed on the plans.

- **Air sealing details**

R402.4 Air Leakage (2015 & 2018)

- **Thermal envelope constructed to limit air leakage with the envelope assembly, including use of air barrier**
- **Sealing methods must account for expansion and contraction**
- **Components of the thermal envelope must comply with Table R402.4.1.1**
- **Testing must be performed in accordance with R402.4.1.2**
- **Testing air leakage rate cannot exceed the values in R402.4.1.2**

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Air Leakage / Air Barrier Requirements

2015 IECC Table R402.4.1.1	2018 IECC Table R402.4.1.1
• General requirements	• General requirements
• Ceiling/attic	• Ceiling/attic
• Walls	• Walls
• Windows, skylights and doors	• Windows, skylights and doors
• Rim joists	• Rim joists
• Floors, including above garages and cantilevered floors	• Floors, including cantilevered floors and floors above garages
• Crawl space walls	• Crawl space walls
• Shafts, penetrations	• Shafts, penetrations
• Narrow cavities	• Narrow cavities
• Garage separation	• Garage separation
• Recessed lighting	• Recessed lighting
• Plumbing and wiring	• Plumbing, and wiring
• Shower/tub on exterior wall	• Shower/tub on exterior wall
• Electrical/phone box on exterior walls	• Electrical/phone box on exterior walls
• HVAC register boots	• HVAC register boots
• Concealed sprinklers	• Concealed sprinklers

General Requirements

2015 & 2018

- **A continuous air barrier shall be installed in the building envelope.**
- **Breaks or joints in the air barrier shall be sealed.**

Common Materials Used

- **Continuous rigid insulation on the exterior**
- **House wrap installed as tested for air barrier**
- **Zip Panels**
- **Drywall**

All joints and seams have been sealed

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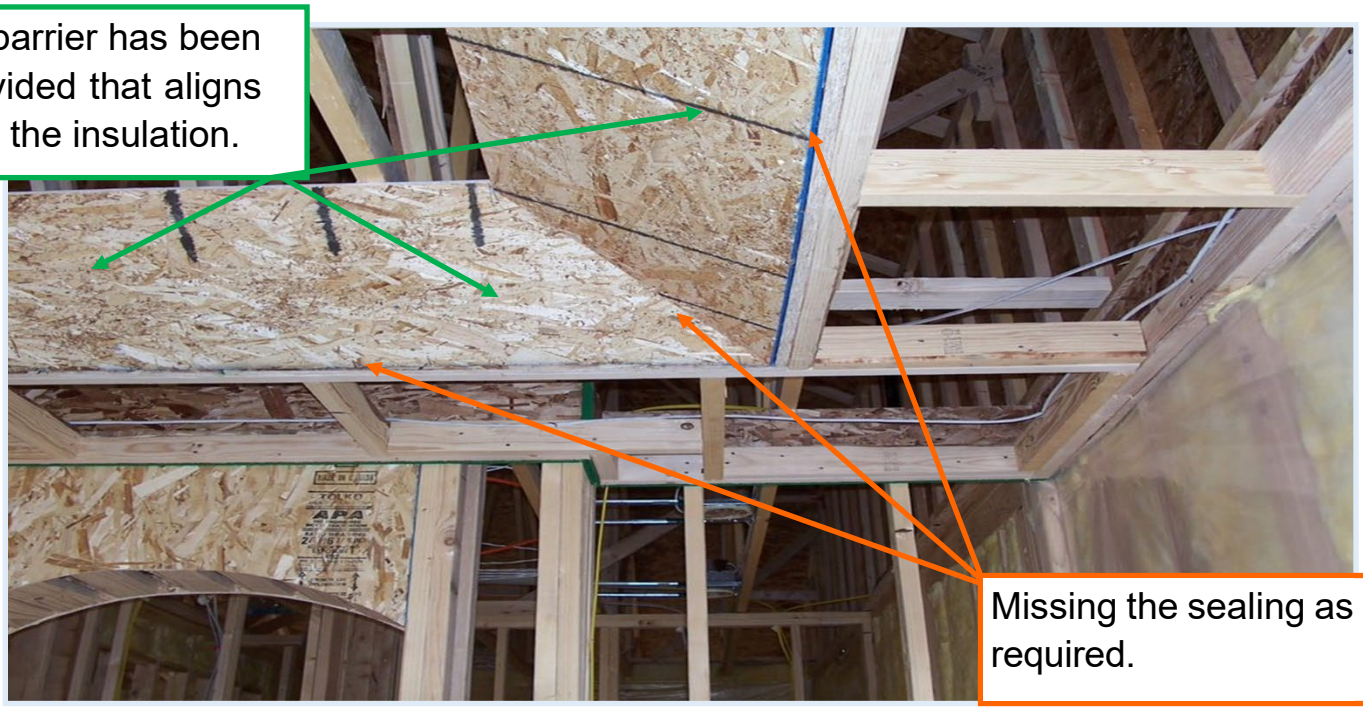
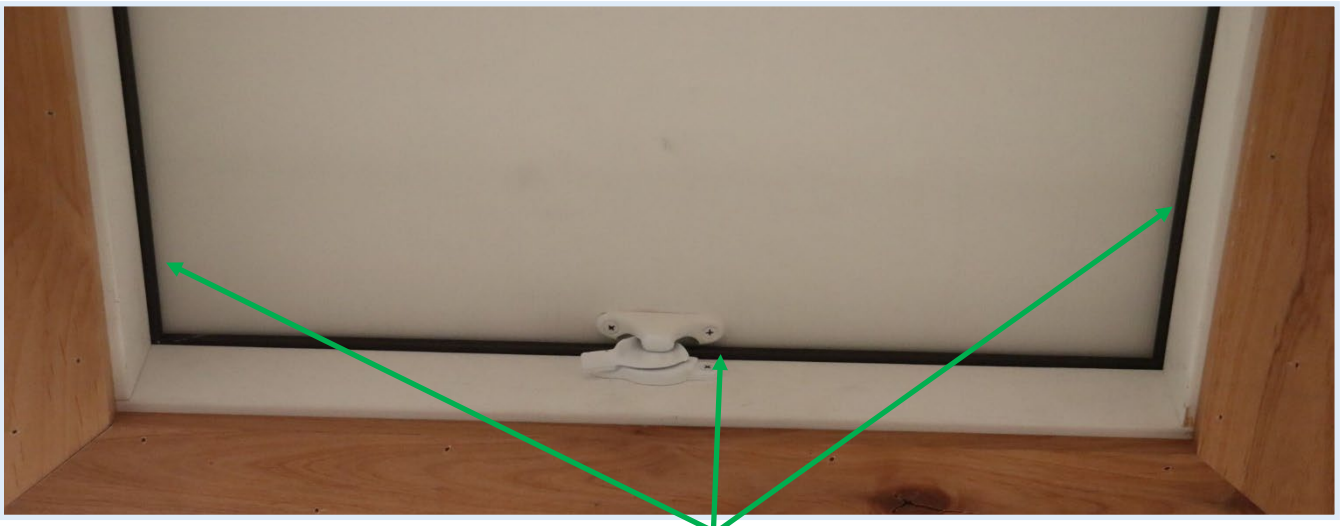
Ceiling/Attic

- The air barrier in any dropped ceiling or soffit shall be aligned with the insulation and any gaps in the air barrier shall be sealed.
- Access openings, drop down stairs or knee wall doors to unconditioned attic spaces shall be sealed.

Air barrier has been provided that aligns with the insulation.



Missing the sealing as required.

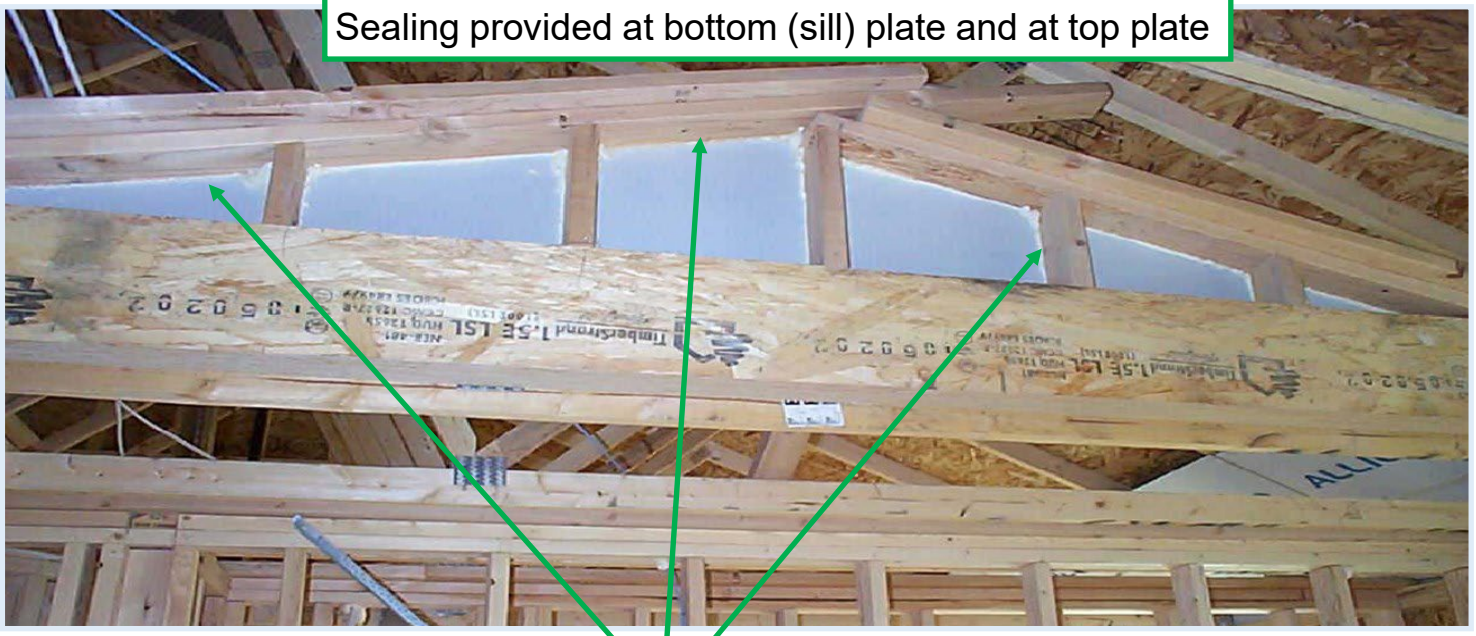


Sealing shown at edges of opening with a gasket.

Walls

- The junction of the foundation and sill plate shall be sealed.
- The junction of the top plate and the top of exterior walls shall be sealed.
- Knee walls shall be sealed.

Sealing provided at bottom (sill) plate and at top plate



Air sealing as the air barrier for the attic knee wall

Windows, Skylights, and Doors

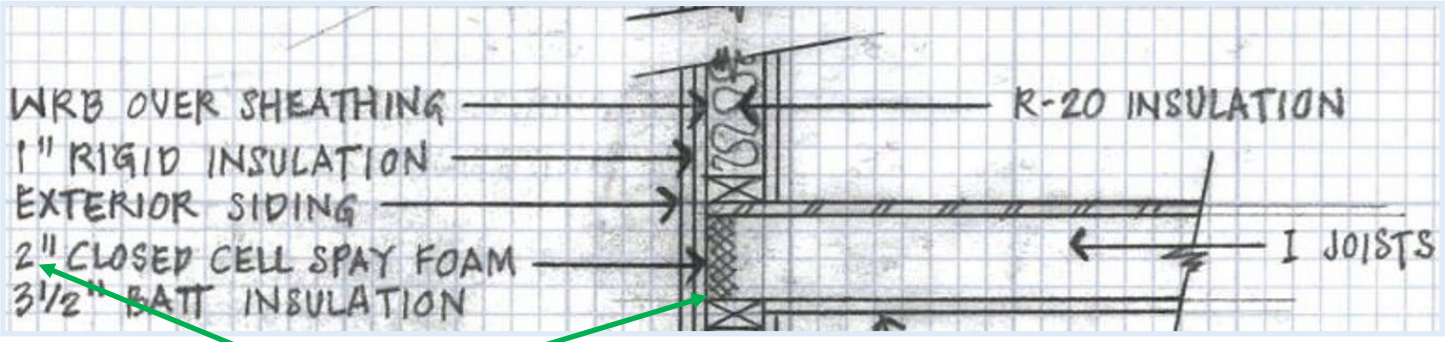
- The space between framing and skylights, and the jambs of windows and doors, shall be sealed.

- Air permeable insulation cannot be used for air sealing.
- FYI - Foam sealants can be used, however the window and door manufacturers do not want/suggest that fast expanding foam to be used.

Rim Joists

2015 & 2018 IECC

- Rim joists shall include the air barrier.

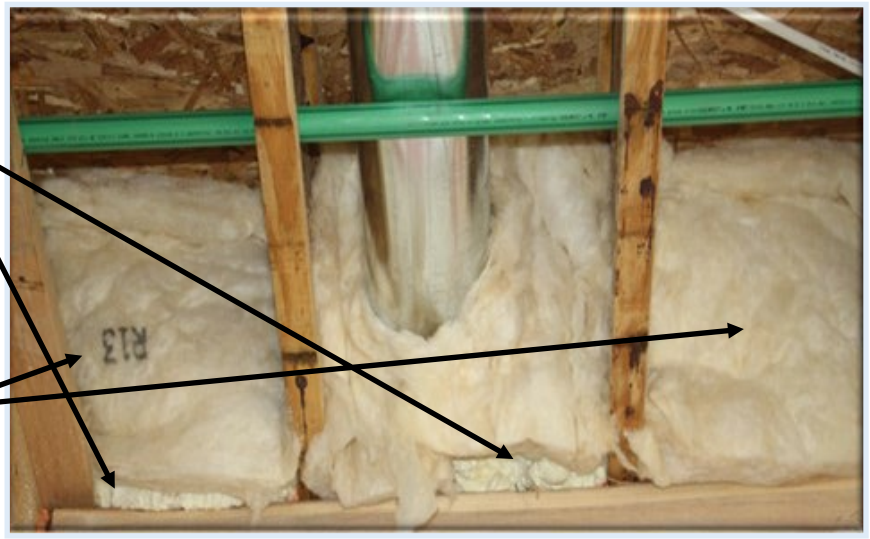


Closed cell spray foam can be considered an air barrier if installed to a designed thickness.

Closed cell spray foam can be both an air barrier and part of the above grade wall insulation R-value.

Spray foams used for air barrier/sealing and as part of the above grade wall R-value.

Batt insulation makes up remainder of R-value for wall.



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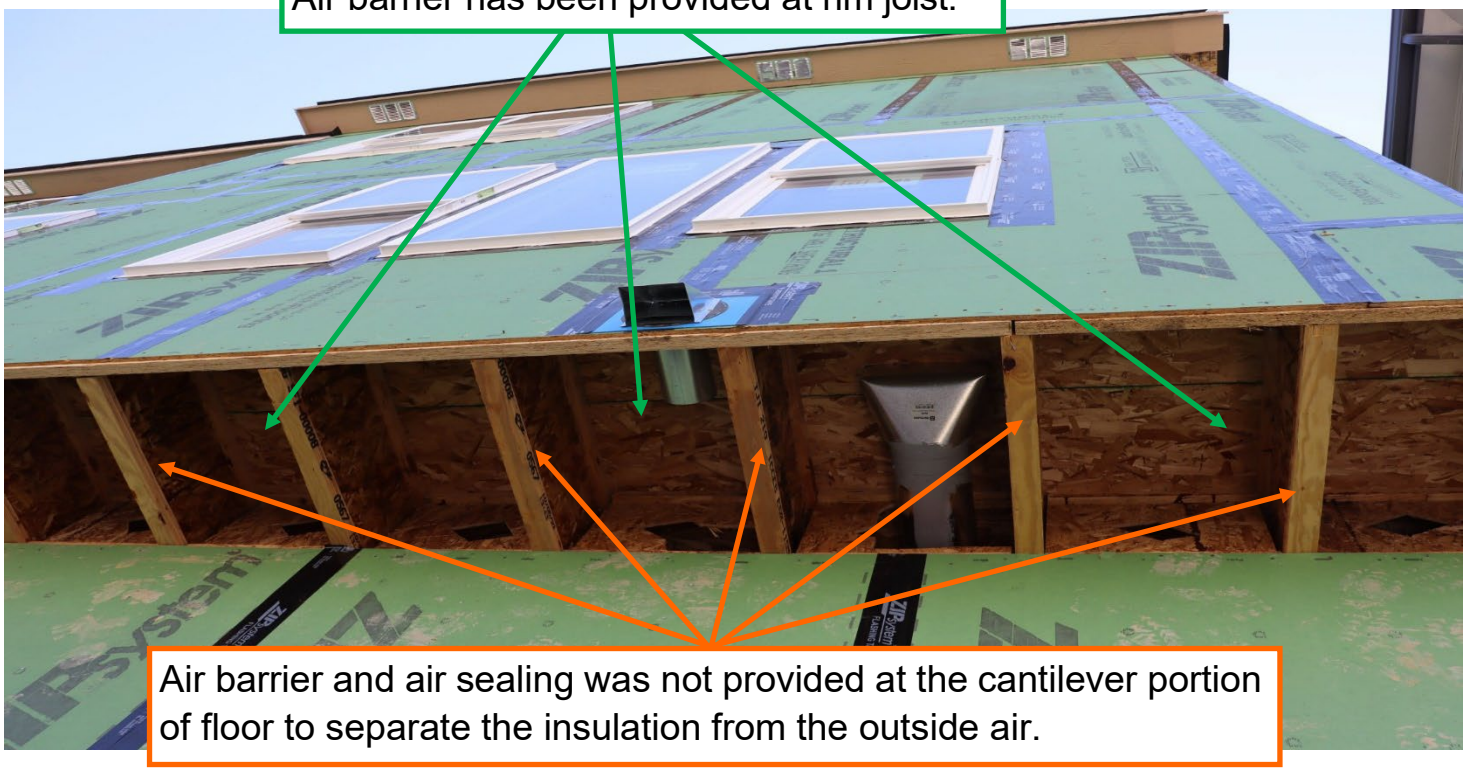
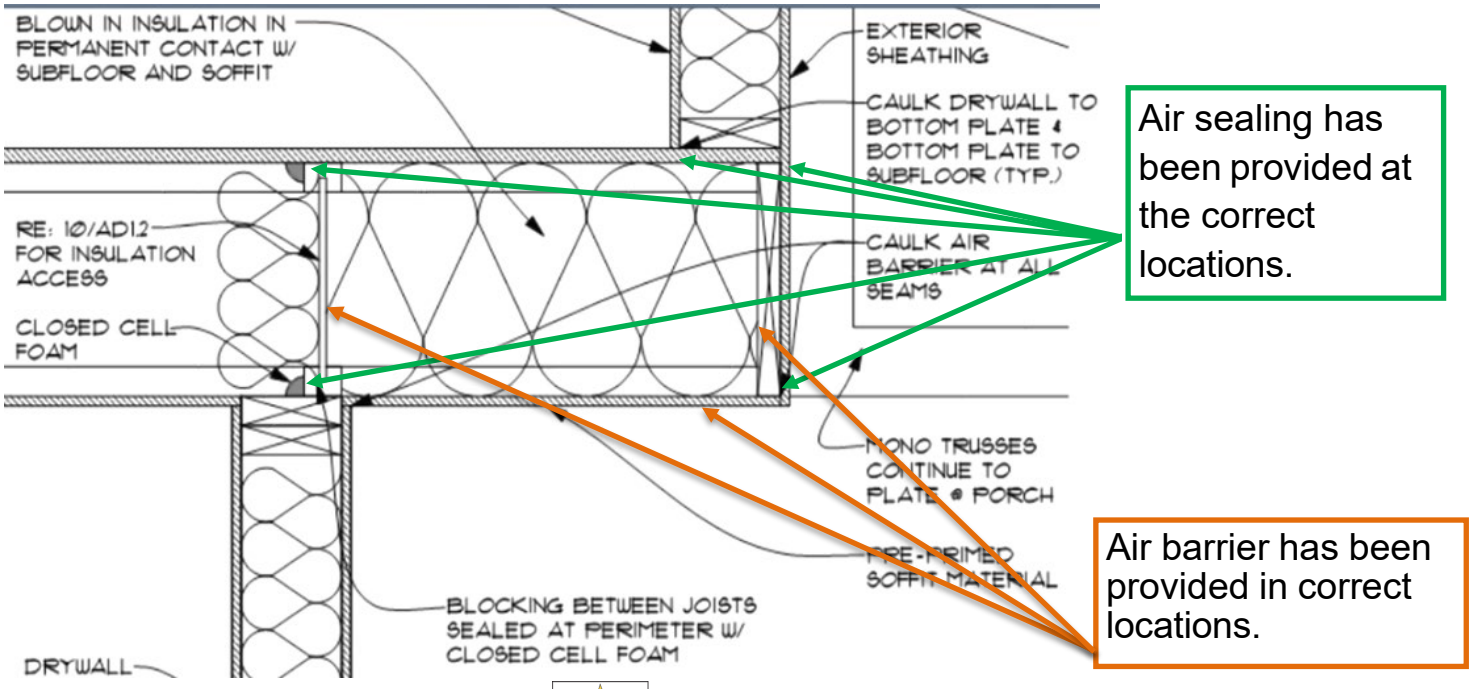
Floors

(including above garages and cantilevered floors)

- The air barrier shall be installed at any exposed edge of insulation.





Crawl Space Walls

2015 & 2018 IECC

- Exposed earth in unvented crawl spaces shall be covered with a Class I vapor retarder with overlapping joints taped.

RECOMMENDED

- Penetrations through concrete foundation walls and slabs shall be air sealed.

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Shafts, Penetrations

2015 & 2018 IECC

- Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space shall be sealed.

RECOMMENDED

- Utility penetrations of the air barrier should be caulked, gasketed or otherwise sealed to allow for expansion and contraction of materials and mechanical vibration.

Exhaust duct not sealed on the interior side, but may be sealed on the exterior.

Exhaust duct sealed by the spray foam used in the rim joist because it meets or exceeds the required thickness to be an air barrier.

This gas line utility penetration should be sealed to allow for expansion and contraction.

If the makeshift cover has penetrated the air barrier the joints and seams will also need sealing.

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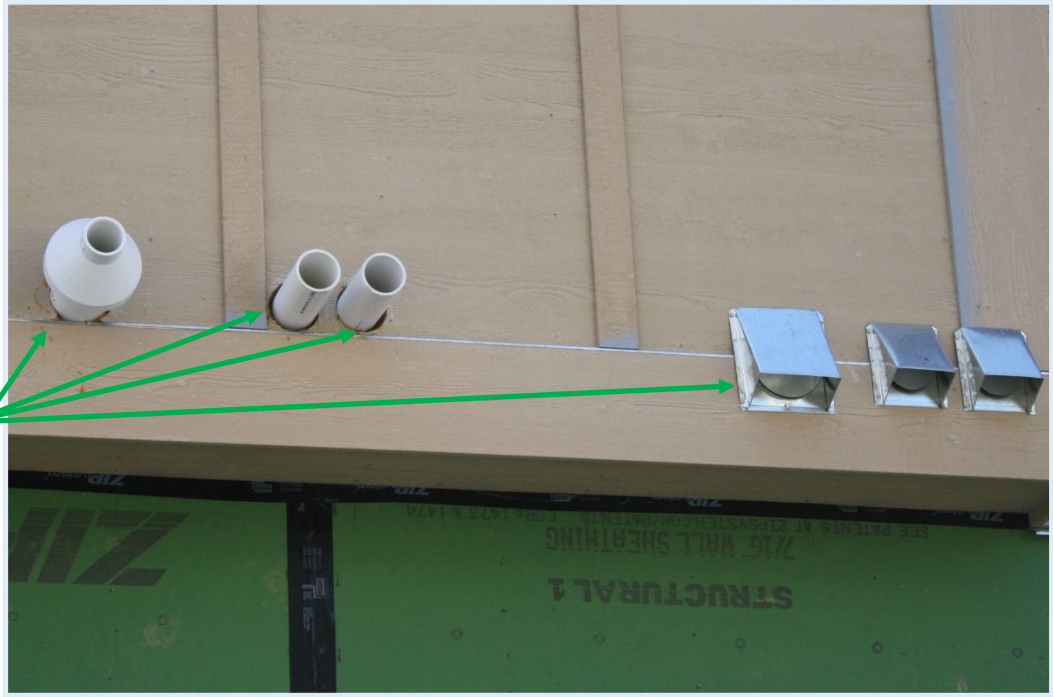
This builder paid close attention to the size of penetration in relation to the size of hole for the penetration. This will allow for a better opportunity for a good air sealing that will last.



The hole created for this penetration was larger than it needed to be for the penetration. This penetration is an odd-shaped penetration that will require some thought on how to create an air seal which will work and last.

There are several issues present here.

The sealant used did not allow for expansion and contraction in the short time from application to inspection and a hole formed.

Was the sealant listed for exterior use?

Was the sealant listed for UV exposure?

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Building Codes Support Program

Narrow Cavities

2015 & 2018 IECC

- NO AIR BARRIER CRITERIA PROVIDED – INSULATION INSTALLATION CRITERIA CALLS FOR PROPER INSTALLATION THAT CONFORMS TO AVAILABLE SPACE.

The image below demonstrates the intent of this requirement to seal those locations.

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Building Codes Support Program

Garage Separation

- Air sealing shall be provided between the garage and conditioned spaces.

Spray foam to a thickness that includes it to be used as an air barrier. The spray foam was installed on the side of the dwelling unit and not on the side of the garage. It does still separate the garage from the conditioned space.

An air barrier is being installed to separate the garage from the dwelling space.

This is a larger process than utilizing spray foam (closed cell– usually 2” and open cell– usually 4.5”) to achieve air barrier and air sealing.

The edges of the air barrier will still be required to be sealed.

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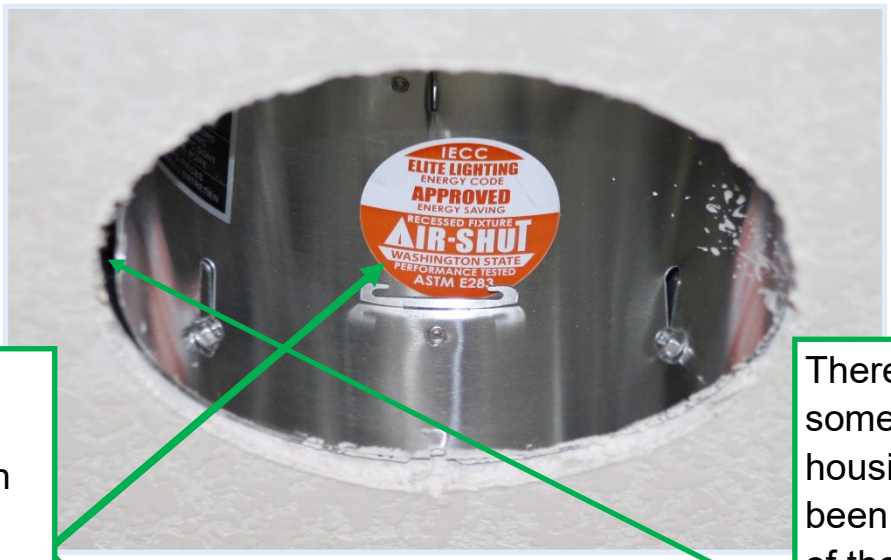
Recessed Lighting

2015 IECC

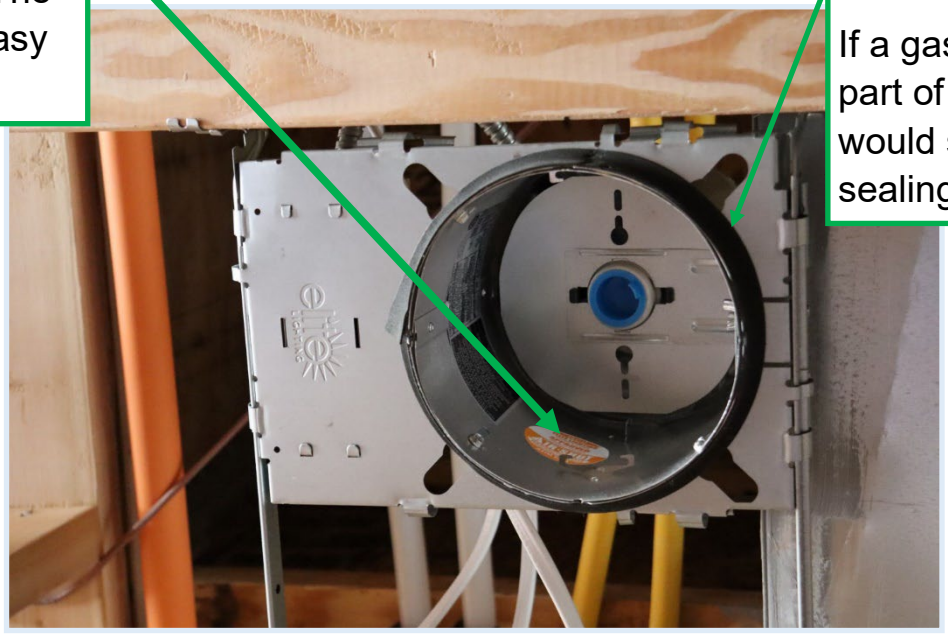
- Recessed light fixtures installed in the building thermal envelope shall be sealed to the finished surface.



The housing for this recessed lighting has been tested to demonstrate the air tightness. The sticker is an easy way to verify.

There does need to be some sealing of the housing. A gasket has been provided as part of the assembly for these.

If a gasket was not a part of this assembly it would still require sealing to be provided.



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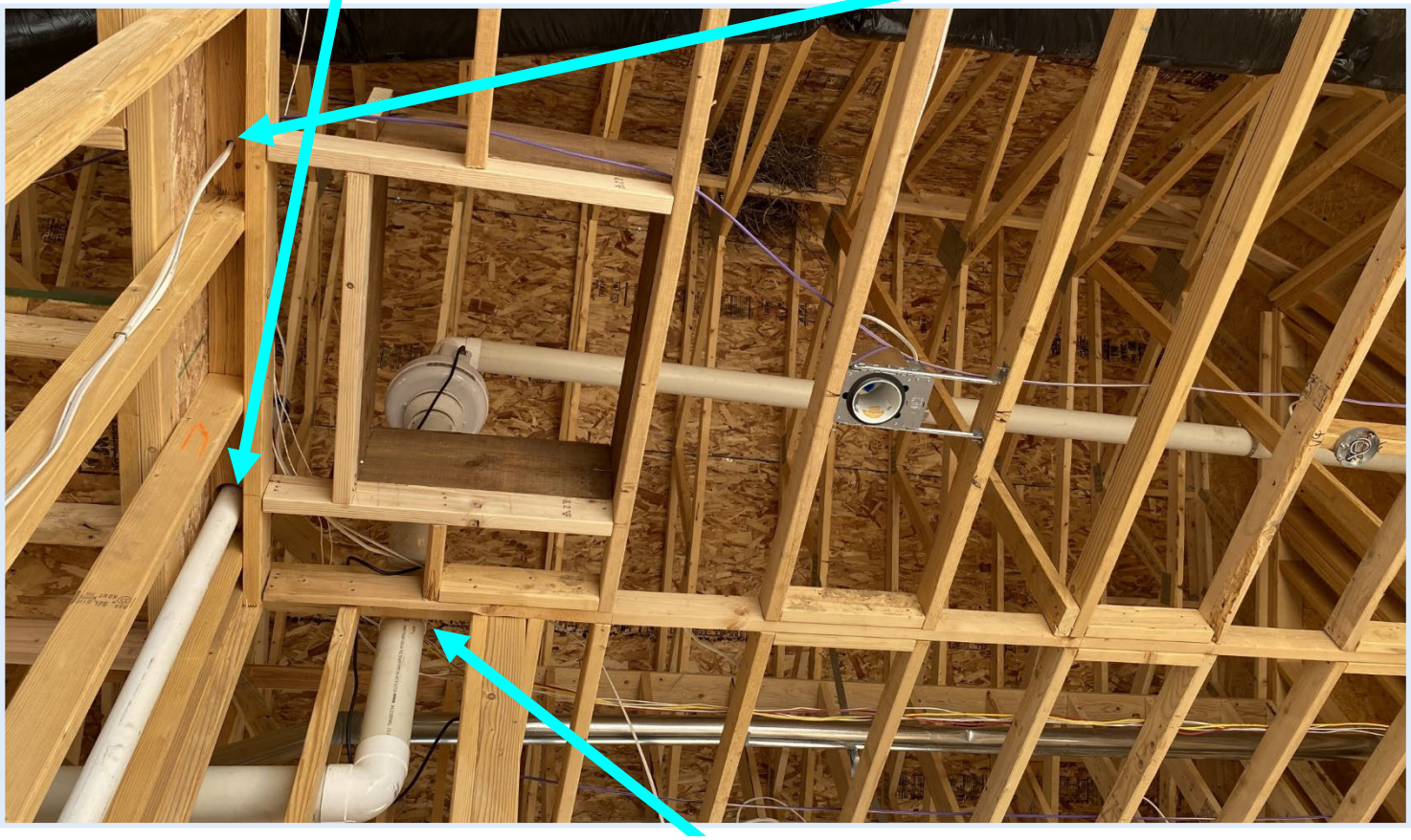
Plumbing and Wiring

2015 & 2018 IECC

- NO AIR BARRIER CRITERIA PROVIDED – INSULATION INSTALLATION CRITERIA CALLS FOR PROPER INSTALLATION THAT CONFORMS THE AVAILABLE SPACE AND EXTENDS BEHIND THE WIRING/PIPING.

Plumbing penetrating the top plate must be sealed.

Wiring penetrating the top plate and drywall must be sealed.



Ceiling is the location of the air barrier.

The radon piping (and other Obstructions) should be air sealed.

NOTE: The electrical box will also need air sealing.

Shower/Tub on exterior wall

- The air barrier installed at exterior walls adjacent to showers and tubs shall separate the wall from the shower or tub.

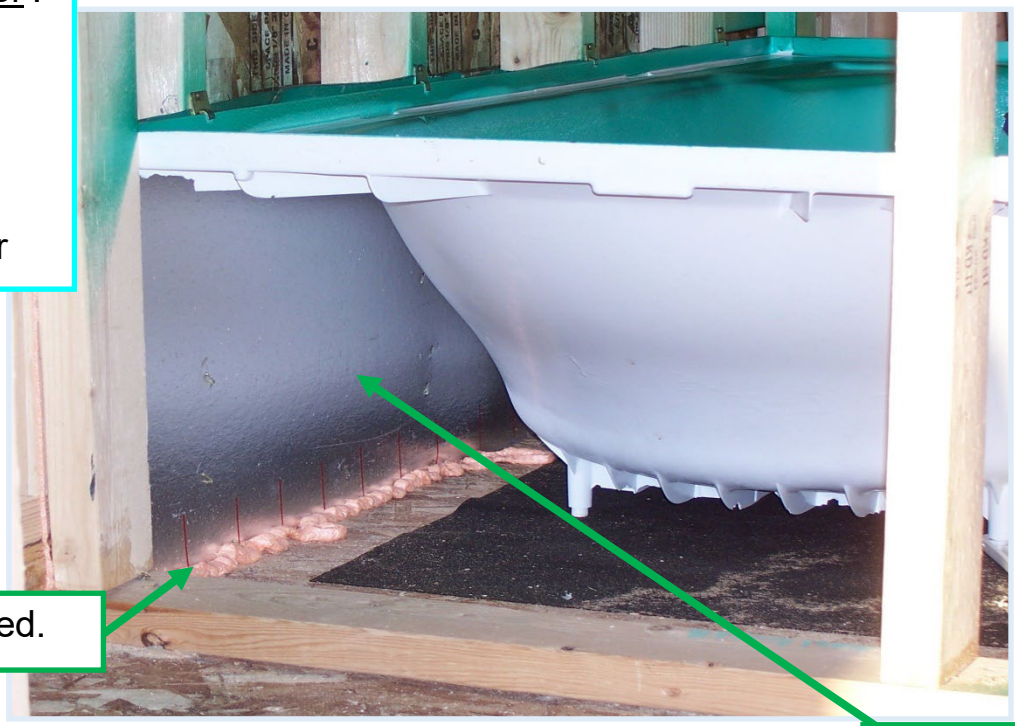
Assembly order :

Sheathing

Insulation

Air barrier

Tub/shower



Sealing provided.

Air barrier provided

Sealing has not been provided yet.

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Electrical/phone box on exterior walls

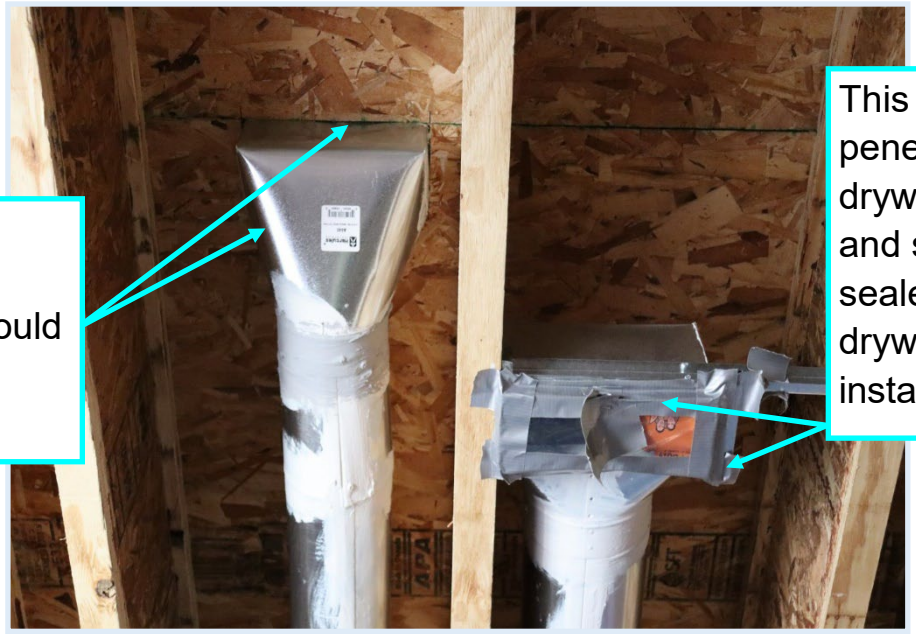
- The air barrier shall be installed behind electrical and communication boxes. Alternatively, **OR** air-sealed boxes shall be installed.

This electrical box is penetrating at the ceiling drywall which is where the thermal envelope and air barrier are located. The wires entering the electrical box have been sealed.

REMEMBER—there are electrical boxes that are located on the exterior of the building that is also penetrating the continuous air barrier. These will also require to be sealed to maintain the integrity of the air barrier assembly. These used a flashing system, but other types of sealing can be utilized.

HVAC Register Boots

- HVAC supply and return register boots that penetrate building thermal envelope shall be sealed to the subfloor, wall covering or ceiling penetrated by the boot.



This register is penetrating the subfloor, and should be sealed to the subfloor.

This register will be penetrating the drywalled ceiling, and should be sealed to the drywall when installed.

This register has penetrated the subfloor and has been sealed as required.

Concealed Sprinklers

- Where required to be sealed, concealed fire sprinklers shall only be sealed in a manner that is recommended by the manufacturer. Caulking or other adhesive sealants shall not be used to fill voids between fire sprinkler cover plates and walls or ceilings.

  - No standardized detail can be provided by the designer. It must come from the manufacturer of the concealed sprinkler head. As an inspector, contractor, or builder you will need to ask for the manufacturer's recommendations on how to correctly install or inspect them.